CLAIMS

1. A modem receiver for receiving signals comprising:

a frequency domain equalizer training module (FTM) being responsive to a frequency channel response for processing the same to generate one or more frequency domain equalizer (FEQ) coefficients, said modem receiver being responsive to an input signal for processing the same to generate said frequency channel response, said input signal being generated from transmission of a transmitted signal, said frequency channel response for including one or more pilot tones, said FEQ coefficients for including one or more pilot tone FEQ coefficients; and

an offset weight determination (OWD) module being responsive to said pilot tone FEQ coefficients for processing the same to generate one or more carrier weights, said modem receiver for using said carrier weights to generate a carrier offset, said OWD module for using said pilot tone FEQ coefficients to generate one or more timing weights, said modem receiver for using said timing weights to generate a timing offset, said modem receiver for reducing the effects of faded pilot tones on determination of said timing offset and said carrier offset between said transmitted signal and said input signal.

2. A modem receiver as recited in claim 1 further including a frequency offset detection module and a timing offset detection module, said frequency offset

detection module for determining said carrier offset by computing a weighted common phase error (CPE^W), said timing offset detection module for determining said timing offset by computing a linear phase error (LPE^M).

3. A modem receiver as recited in claim 2 wherein said OWD module for using the logarithmic (log) value of said pilot tone FEQ coefficients to determine said carrier weights, said OWD for rounding off said log value to determine said carrier weights, the i^{th} one of said carrier weights (W_i) being determined from the i^{th} one of said pilot tone FEQ coefficients (FEQ_i) according to: $W_i = \text{round}(-\log(|FEQ_i|^2))$.

4. A modem receiver as recited in claim 3 wherein said frequency offset detection module being responsive to said carrier weights for processing the same to generate one or more weighted pilot tones, the i^{th} one of said weighted pilot tones ($\text{shr}(p_i, W_i)$) being generated by a binary shift right function by shifting the integer value of the i^{th} one of said pilot tones (p_i) to the right by W_i places.

5. A modem receiver as recited in claim 3 wherein the number of said pilot tones is 4.

6. A modem receiver as recited in claim 4 wherein said CPE^W being determined by computing the angle of the sum of said weighted pilot tones

using an arctangent (atan) function, the argument of said atan function for including the imaginary (imag) and real parts of said weighted pilot tones according to:

$CPE^W = angle(\Sigma shr(p_i,W_i) = atan(imag(\Sigma shr(p_i,W_i))/real(\Sigma shr(p_i,W_i)))$.

7. A modem receiver as recited in claim 5 wherein said OWD module for generating 2 intermediate weights (WI_1, WI_2) using said pilot tone FEQ coefficients according to:

$WI_1 = round(-log(|FEQ_2|^2) - log(|FEQ_3|^2))$,

$WI_2 = round(-log(|FEQ_1|^2) - log(|FEQ_4|^2))$.

8. A modem receiver as recited in claim 7 wherein said OWD module for generating 2 timing weights (M_1, M_2) using said intermediate weights according to:

$M_1 = round(512 * WI_2 / (WI_1 + WI_2))$,

$M_2 = 512 - M_1$.

9. A modem receiver as recited in claim 8 wherein said timing offset detection module being responsive to said pilot tones for processing the same to generate 2 intermediate angles (θ_1, θ_2), said timing offset detection module for weighting said timing weights with said θ_1 and θ_2 to generate said LPE^M according to:

$LPE^M = (M_1\theta_1 + M_2\theta_2) / 512$.

10. A modem receiver as recited in claim 2 wherein said FEQ being responsive to said frequency channel response to process the same to generate equalized data symbols, each of said equalized data symbols for including one or more equalized data subcarriers, said modem receiver further including a feedforward correction module for using said CPE^W to process each of said equalized data symbols to generate a corrected equalized data symbol for enhancing protection against excessive radio frequency (RF) carrier impairment.

11. A modem receiver as recited in claim 2 further including a frequency loop filter responsive to said CPE^W for using the same to generate a frequency loop filter output, said modem receiver further including a carrier numerically controlled oscillator (NCO) being responsive to said frequency loop filter output to generate a frequency correction signal.

12. A modem receiver as recited in claim 11 further including a timing loop filter responsive to said LPE^M for using the same to generate a timing loop filter output, said modem receiver further including a timing NCO being responsive to said timing loop filter output to generate a timing adjustment signal, said modem receiver further including a buffer/interpolator being responsive to said timing adjustment signal for processing the same to generate a buffer/interpolator output by correcting for said timing offset.

13. A modem receiver as recited in claim 12 further including a first frequency shifter being responsive to said input signal for converting the same to a baseband signal.

14. A modem receiver as recited in claim 13 further including a low pass filter being responsive to said buffer/interpolator output for processing the same to generate a filtered baseband signal, said modem receiver further including a second frequency shifter being responsive to said filtered baseband signal and said frequency correction signal for processing the same to generate an adjusted signal by correcting for said carrier offset.

15. A modem receiver as recited in claim 2 wherein said input signal includes a preamble portion and a data portion, said timing weights and said carrier weights being determined during said preamble portion, said CPE^W and said LPE^M being determined during said data potion.

16. A method for receiving signals comprising:

receiving a frequency channel response for processing the same to generate one or more frequency domain equalizer (FEQ) coefficients including pilot tone FEQ coefficients;

receiving an input signal for processing the same to generate the frequency channel response including one or more pilot tones;

processing the pilot tone FEQ coefficients to generate one or more carrier weights;

generating a carrier offset;

using the pilot tone FEQ coefficients to generate one or more timing weights; and

generating a timing offset for reducing the effects of faded pilot tones on determination of the timing and carrier offsets.

17. A modem receiver for receiving signals comprising:

a frequency domain equalizer training module (FTM) being responsive to a frequency channel response for processing the same to generate one or more frequency domain equalizer (FEQ) coefficients, said modem receiver being responsive to an input signal for processing the same to generate said frequency channel response, said input signal being generated from transmission of a transmitted signal, said frequency channel response for including one or more pilot tones, said FEQ coefficients for including one or more pilot tone FEQ coefficients; and

an offset weight determination (OWD) module being responsive to said pilot tone FEQ coefficients for processing the same to generate one or more carrier weights, said modem receiver for using said carrier weights to generate a carrier offset, said modem receiver for reducing the effects of faded pilot tones on determination of said carrier offset between said transmitted signal and said input signal.

18. A modem receiver for receiving signals comprising:

a frequency domain equalizer training module (FTM) being responsive to a frequency channel response for processing the same to generate one or more frequency domain equalizer (FEQ) coefficients, said modem receiver being responsive to an input signal for processing the same to generate said frequency channel response, said input signal being generated from transmission of a transmitted signal, said frequency channel response for including one or more pilot tones, said FEQ coefficients for including one or more pilot tone FEQ coefficients; and

an offset weight determination (OWD) module being responsive to said pilot tone FEQ coefficients for processing the same to generate one or more timing weights, said modem receiver for using said timing weights to generate a timing offset, said modem receiver for reducing the effects of faded pilot tones on determination of said timing offset between said transmitted signal and said input signal.

19. A modem receiver for receiving signals comprising:

means for receiving a frequency channel response for processing the same to generate one or more frequency domain equalizer (FEQ) coefficients including pilot tone FEQ coefficients;

means for receiving an input signal for processing the same to generate the frequency channel response including one or more pilot tones;

means for processing the pilot tone FEQ coefficients to generate one or more carrier weights;

means for generating a carrier offset;

means for using the pilot tone FEQ coefficients to generate one or more timing weights; and

means for generating a timing offset for reducing the effects of faded pilot tones on determination of the timing and carrier offsets.

20. A computer readable medium having stored therein computer readable program code comprising:

receiving a frequency channel response for processing the same to generate one or more frequency domain equalizer (FEQ) coefficients including pilot tone FEQ coefficients;

receiving an input signal for processing the same to generate the frequency channel response including one or more pilot tones;

processing the pilot tone FEQ coefficients to generate one or more carrier weights;

generating a carrier offset;

using the pilot tone FEQ coefficients to generate one or more timing weights; and

generating a timing offset for reducing the effects of faded pilot tones on determination of the timing and carrier offsets.